of at least one proximal hole directed towards head and neck of femur making an angle of 120° to 140° with said longitudinal axis of medullary canal and said longitudinal axis of nail to match neck shaft angle of femur and at the same time the plane of said proximal hole is making an angle of 5° to 20° with horizontal plane passing through said long axis of medullary canal of femur and said longitudinal axis of nail to match said anteversion angle of head and neck of femur, said shaft having plural distal holes and axis of at least one distal hole making an angle of 90° with said longitudinal axis of medullary canal and said longitudinal axis of intramedullary nail when said intramedullary nail is in position in said medullary canal and a buttress plate with barrels adapted in use with said nail, said buttress plate contoured or contourable to upper part of said femur having at least one proximal hole where axis of said proximal hole arranged concentric with axis of at least one said proximal hole in nail towards head and neck of femur for insertion of anchoring means adapted in use to engage said head and neck of femur.

[2] An implant assembly of claim 1, further comprising:
at least one proximal sliding hip pin for insertion through said proximal holes in said nail, said pin having holding portion other than thread surface formed at the leading end adapted in use to engage head and neck of femur, smooth part formed on the remaining portion of its length, said smooth part being adapted in use for continuous sliding contact with said proximal holes of nail, inner surface of said barrels, inner surface of said proximal holes in buttress plate permitting limited controlled collapse of selected fractures leading to bone to bone contact.

[3] An implant assembly of claim 1, further comprising:
said unitary intramedullary nail of short length version having anterior curvature in said tail end to match anterior curvature of said medullary canal of femur to avoid abutting of tip of said tail end to anterior cortex of middle part of shaft of femur and prevent stress concentration leading to pointing effect with thigh pain and fracture of shaft of femur later on.

[4] An implant assembly of claim 1, further comprising:
said connecting end of targeting device having matching diameter with internally threaded part of said intramedullary nail wherein said targeting device gets

connected by said cannulated connecting bolt with said intramedullary nail and said connecting end of said targeting device is short and compact to reduce the size of incision for insertion of said intramedullary nail and does not obstruct intraoperative imaging even though when it is not radiolucent.

[5] An implant assembly of claim 1, further comprising:
said block of plurality of proximal holes of targeting device having axis of at least one said proximal hole making an angle of 120° to 140° with said longitudinal axis of medullary canal of femur to match the neck shaft angle of femur and at the same time plane of said proximal hole making an angle of 5° to 20° with horizontal plane passing through said longitudinal axis of medullary canal of femur to match said anteversion angle of head and neck of femur to have placement of a hip pins in centre of neck and head without rotating targeting device.

[6] An implant assembly of claim 1, further comprising:
said block of plurality of distal holes of targeting device having axis of at least one said distal hole making an angle of 90° with said longitudinal axis of medullary canal and said long axis of intramedullary nail when said intramedullary nail is in position in said medullary canal of femur.

[7] An implant assembly of claim 1, further comprising:
said block of plurality of proximal holes and said block of plurality of distal holes of said targeting device having their placement in different plane.

[8] An implant assembly of claim 1, further comprising:
said block of plurality of proximal holes and said block of plurality of distal holes of said targeting device wherein plane of at least one said proximal hole making an angle of 5° to 20° with horizontal plane passing through at least one said distal hole of targeting device.

[9] An implant assembly of claim 1, further comprising:
said block of plurality of proximal holes wherein plane of at least one said proximal hole making an angle with plane passing through at least one another proximal hole of targeting device.

[10] An implant assembly of claim 1, further comprising:

said block of plurality of proximal holes of targeting device having distance between tip of said connecting end of targeting device and said proximal holes kept at "X" value and at the same time distance in between said proximal holes kept at "Y" value where the values of "X" and "Y" in millimeters kept in such a way that where placement of at least one sliding hip pin happens through said proximal hole in nail near dense bone of calcar for better fixation and other sliding hip pin placed avoiding superior surface of neck of femur preventing "cut through" of said sliding hip pin from neck and head of femur.

[11] An implant assembly of claim 1, further comprising:

said block of plurality of distal holes of targeting device being adapted in use when said short length version of intramedullary nail is placed in medullary canal having distance between tip of said connecting end of targeting device and said distal holes of targeting device kept at "Z" value in millimeters in such a way that said distal holes of targeting device target corresponding said distal holes of said intramedullary nail before said anterior curvature of femur starts to get sure distal interlocking of said nail with femur without any chance to miss the said distal holes in nail.

[12] An implant assembly of claim 1, further comprising:

said unitary intramedullary nail having reducing cross section area and wall thickness of said intramedullary nail gradually from said thigh end to said tail end to match shape of said intramedullary nail with shape of said intramedullary canal of femur to avoid high hoop stress in said medullary canal while inserting said intramedullary nail.

[13] An implant assembly of claim 1, further comprising:

said unitary intramedullary nail having longitudinal axis of said knee end and said intermediate shaft portion concentric with said axis of medullary canal, longitudinal axis of said thigh end or head portion making an angle with said longitudinal axis of medullary canal and said longitudinal axis of said knee end and said intermediate portion to allow entry of said intramedullary nail from tip of greater trochanter.

[14] An implant assembly of claim 1, further comprising:
said plural proximal holes of intramedullary nail having axis of at least one proximal hole making an angle of 120° to 140° with said longitudinal axis of medullary canal of femur to match the said neck shaft angle of femur and at the same time plane of said proximal hole making an angle of 5° to 20° with horizontal plane passing through said longitudinal axis of medullary canal of femur to match said anteversion angle of said head and neck of femur and to have placement of said hip pins in centre of neck and head without rotating said nail mounted on said targeting device

[15] An implant assembly of claim 1, further comprising:
said plural distal holes of intramedullary nail having axis of at least one distal hole making an angle of 90° with said longitudinal axis of medullary canal and longitudinal axis of said intramedullary nail when said intramedullary nail is in position in said medullary canal of femur.

[16] An implant assembly of claim 1, further comprising:
said plural proximal holes and said plural distal holes of intramedullary nail having their placement in different plane in said nail.

[17] An implant assembly of claim 1, further comprising:
said plural proximal holes and said plural distal holes of intramedullary nail wherein plane of at least one said proximal hole in said intramedullary nail making an angle of 5° to 20° with horizontal plane passing through at least one said distal hole in said intramedullary nail.

[18] An implant assembly of claim 1, further comprising:
said plural proximal holes wherein plane of at least one said proximal hole making an angle with plane passing through at least one another proximal hole in said nail.

[19] An implant assembly of claim 1, further comprising:
said plural proximal holes of intramedullary nail having distance between tip of said connecting end of intramedullary nail and said proximal holes kept at "X1" value and at the same time distance in between said proximal holes kept at "Y1"

value where the values of "X1" and "Y1" in millimeters kept in such a way that where placement of at least one sliding hip pin through said proximal hole in nail happens near dense bone of said calcar for better fixation and other sliding hip pin placed avoiding superior surface of neck preventing "cut through" of said sliding hip pin from said neck and head of femur.

[20] An implant assembly of claim 1, further comprising:
said plural distal holes of said short length version of intramedullary nail having distance between tip of said connecting end of short length version intramedullary nail and said distal holes kept at "Z1" value in millimeters in such a way that said distal holes of targeting device target corresponding said distal holes of said short length version intramedullary nail before said anterior curvature of femur starts to get sure distal interlocking of said nail with femur without any chance to miss the said distal holes in said nail.

[21] An implant assembly of claim 1, further comprising:
at least one proximal hole of intramedullary nail having generally other than round shape such as "hexagonal or "key hole " and inner diameter matching with shape and outer diameter of a sliding smooth part of proximal sliding hip pin to have continuous sliding contact for said sliding proximal hip pins and to have better rotation stability in between a proximal hole acting as barrel and a proximal hip pin to permit controlled limited collapse of fracture gap of selected fractures

[22] An implant assembly of claim 1, further comprising:
said intramedullary nail having relatively smaller diameter of said thigh end to preserve more bone tissue.

[23] An implant assembly of claim 2, further comprising:
said proximal hip pin wherein said holding part having at least one scalloped surface.

[24] An implant assembly of claim 2, further comprising:
said proximal hip pin wherein said holding part having mores taper towards leading end

[25] An implant assembly of claim 2, further comprising:
at least one proximal sliding hip pin having outer shape of said sliding smooth part generally other than round shape such as “hexagonal or "key” and outer diameter matching with shape and diameter of proximal holes in intramedullary nail to have better rotation stability in between said proximal hole and said sliding smooth part of proximal hip pin to permit controlled limited collapse of fracture gap of selected fractures.

[26] An implant assembly of claim 2, further comprising:
said proximal sliding hip pin wherein said holding part having plural holes connecting central cannulation of said proximal hip pin to allow injection of liquid cement or other augmentation material to augment the hold of said proximal hip pin in head and neck of femur.

[27] An implant assembly of claim 1, further comprising:
cannulated variable length end cap having shaft part generally with threads having outer diameter matching inner diameter of said thigh end of intramedullary nail to seal said nail and having head part matching outer diameter of said head end of intramedullary nail and said head part is having variable length to enhance the total length of said nail when required.

[28] A targeting device being adapted in use for insertion of intramedullary nail in medullary canal of femur and to align and direct anchoring means to pass through femur and holes in intramedullary nail to secure intramedullary nail within the medullary canal of femur for treatment of fractures of femur comprising:
connecting end to connect with thigh end of intramedullary nail by temporary connecting bolt, a handle part, block of plural proximal holes comprising plural proximal holes targeting corresponding plural proximal holes of said intramedullary nail and block of plural distal holes comprising plural distal holes targeting corresponding plural distal holes of said intramedullary nail;
at least one distal hole in said block of distal holes being arranged on a axis extending through said distal holes in said nail in a transverse direction relative to the longitudinal axis of said nail ; at least one proximal hole in block of proximal

holes arranged on a axis extending through said proximal holes of said nail in an angled direction relative to the longitudinal axis of said nail such that when said nail is in position within the medullary canal of the femur said axis of said proximal hole is directed toward the head and neck of the femur and at the same time plane passing through said axis of said proximal hole is making an angle with horizontal plane passing through said longitudinal axis of medullary canal and said longitudinal axis of intramedullary nail to match the anteversion angle of head and neck of femur.

[29] A targeting device recited in claim 28, further comprising:

said connecting end of targeting device having matching diameter with internally threaded part of said intramedullary nail wherein said targeting device gets connected by said cannulated connecting bolt with said intramedullary nail and said connecting end of said targeting device is short and compact to reduce the size of incision for insertion of said intramedullary nail and does not obstruct intraoperative imaging even though when it is not radiolucent.

[30] A targeting device recited in claim 28, further comprising:

said block of plurality of proximal holes of targeting device wherein axis of at least one proximal hole targeting said proximal hole of nail making an angle with said longitudinal axis of intramedullary canal of femur directed towards head and neck of femur to match the said neck shaft angle of femur and at the same time plane passing through said axis of proximal hole is making an angle with horizontal plane passing through longitudinal axis of medullary canal of femur to match said anteversion angle of head and neck of femur to have placement of said hip pins in centre of neck and head without rotating targeting device.

[31] A targeting device recited in claim 28, further comprising:

said block of plurality of distal holes of targeting device wherein axis of at least one distal hole placed transversely in relation to said longitudinal axis of medullary canal and long axis of said intramedullary nail when said intramedullary nail is in position in medullary canal of femur.

[32] A targeting device recited in claim 28, further comprising:

said block of plurality of proximal holes and said block of plurality of distal holes of said targeting device having their placement on said targeting device in different plane.

[33] A targeting device recited in claim 28, further comprising:
said block of plurality of proximal holes and said block of plurality of distal holes of said targeting device wherein said plane of at least one said proximal hole making an angle with horizontal plane passing through at least one said distal hole of targeting device.

[34] A targeting device recited in claim 28, further comprising:
said block of plurality of proximal holes wherein plane of at least one said proximal hole is making an angle with plane passing through at least one another proximal hole of targeting device.

[35] A targeting device recited in claim 28, further comprising:
said block of plurality of proximal holes of targeting device wherein distance between tip of said connecting end of targeting device and said proximal holes kept at "X" value and at the same time distance in between said proximal holes kept at "Y" value where the values of "X" and "Y" in millimeters kept in such a way that where placement of at least one sliding hip pin happens near dense bone of calcar for better fixation and other sliding hip pin placed avoiding superior surface of neck of femur preventing "cut through" of said superior sliding hip pin from neck and head of femur.

[36] A targeting device recited in claim 28, further comprising:
said block of plurality of distal holes of targeting device being adapted in use when said short length version of intramedullary nail is placed in medullary canal wherein distance between tip of said connecting end of targeting device and said distal holes of targeting device kept at "Z" value in millimeters in such a way that said distal holes of targeting device target corresponding said distal holes of said intramedullary nail before said anterior curvature of femur starts to get sure distal interlocking of said nail with femur without any chance to miss the said distal holes in nail.

[37] Apparatus for treating fractures of the femur comprising:

a unitary intramedullary nail having a longitudinal axis and defining a coaxial bore there through, said nail having proximal thigh end portion or head and part distal thereto having intermediate portion or shaft and knee end portion or tail, and being adapted in use for insertion into the medullary canal of a femur; said shaft and said tail having plural distal holes being targeted by corresponding plural distal holes of said targeting device and head portion having plural proximal holes being targeted by corresponding proximal holes of said targeting device ; at least one said distal hole of said nail arranged on a axis extending through said bore in a transverse direction relative to the longitudinal axis of said nail ; at least one said proximal hole of said nail arranged on a axis extending through said bore in an angled direction relative to the longitudinal axis of said nail such that when said nail is in position within the said medullary canal of the femur said axis of said proximal hole in said nail is directed toward the head and neck of the femur at the same time plane passing through said axis of said proximal hole is making an angle with the horizontal plane passing through said longitudinal axis of medullary canal and said longitudinal axis of intramedullary nail to match the anteversion angle of head and neck of femur.

[38] The apparatus recited in claim 37, further comprising:

at least one proximal sliding hip pin for insertion through said proximal holes in said nail, said pin having holding portion other than thread surface formed at the leading end adapted in use to engage head and neck of femur, smooth part formed on the remaining portion of its length, said smooth part being adapted in use for continuous sliding contact with said proximal hoes of nail, inner surface of barrels, inner surface of proximal holes in buttress plate permitting limited controlled collapse of selected fractures leading to bone to bone contact.

[39] The apparatus recited in claim 37, further comprising:

a buttress plate generally with barrels adapted in use with said nail , said buttress plate contoured or contour able to upper part of said femur having at least one proximal hole where axis of said proximal hole arranged concentric with said axis of proximal holes in nail towards head and neck of femur.

[40] The apparatus recited in claim 37, further comprising:

said unitary intramedullary nail having longitudinal axis of said knee end and said intermediate shaft portion concentric with axis of said medullary canal, longitudinal axis of said thigh end or head portion making an angle with said longitudinal axis of medullary canal and said longitudinal axis of said knee end and said intermediate portion to allow entry of said intramedullary nail from tip of greater trochanter.

[41] An apparatus recited in claim 37, further comprising:

said plural proximal holes of intramedullary nail wherein axis of at least one proximal hole making an angle with said longitudinal axis of medullary cana of femur to match the said neck shaft angle of femur and at the same time plane of said proximal hole making an angle with horizontal plane passing through said longitudinal axis of medullary canal of femur to match said anteversion angle of said head and neck of femur to have placement of said hip pins in centre of neck and head without rotating said nail mounted on said targeting device.

[42] An apparatus recited in claim 37, further comprising:

said plural proximal holes and said plural distal holes having their placement in different plane in said nail.

[43] An apparatus recited in claim 37, further comprising:

said plural proximal holes and said plural distal holes of intramedullary nail wherein plane of at least one said proximal hole in said intramedullary nail is making an angle with horizontal plane passing through at least one said distal hole in said intramedullary nail.

[44] An apparatus recited in claim 37, further comprising:

said plural proximal holes wherein plane of at least one said proximal hole is making an angle with plane passing through at least one another proximal hole in said nail.

[45] An apparatus recited in claim 37, further comprising:

said plural proximal holes of intramedullary nail having distance between tip of said connecting end of intramedullary nail and said proximal holes kept at "X1" value and at the same time distance in between said proximal holes kept at "Y1" value where the values of "X1" and "Y1" in millimeters kept in such a way that where placement of at least one said sliding hip pin happens through said proximal hole in nail near dense bone of calcar for better fixation and other sliding hip pin placed avoiding superior surface of neck preventing "cut through" of said sliding hip pin from said neck and head of femur.

[46] An apparatus recited in claim 37, further comprising:
said plural distal holes of said short length version of intramedullary nail wherein distance between tip of said connecting end of short length version intramedullary nail and said distal holes kept at "Z1" value in millimeters in such a way that said distal holes of targeting device target corresponding said distal holes of said short length version intramedullary nail before said anterior curvature of femur starts to get sure distal interlocking of said nail with femur without any chance to miss the said distal holes in said nail.

[47] An apparatus recited in claim 37, further comprising:
said plural proximal holes of intramedullary nail having generally other than round shape such as "hexagonal or "key hole " and inner diameter matching with shape and outer diameter of said sliding smooth part of proximal sliding hip pins to have continuous sliding contact for said sliding proximal hip pins and to have better rotation stability in between said proximal holes acting as barrels and said proximal hip pins to permit controlled limited collapse of fracture gap of selected fractures.

[48] An apparatus recited in claim 37, further comprising:
said intramedullary nail having relatively smaller diameter of said thigh end to preserve more bone tissue.

[49] An apparatus recited in claim 37, further comprising:
said unitary intramedullary nail having reducing cross section area and wall thickness of said intramedullary nail gradually from said thigh end portion to said intermediate portion or shaft to said distal knee end portion or tail to match shape

of said intramedullary canal of femur to avoid high hoop stress in medullary canal while inserting said intramedullary nail.

[50] An apparatus recited in claim 37, further comprising:
said intramedullary nail and said proximal hip pins having central cannulation.

[51] An apparatus recited in claim 38, further comprising:
said proximal hip pin wherein said holding part having at least one scalloped surface.

[52] An apparatus recited in claim 38, further comprising:
said proximal hip pin wherein said holding part having mores taper towards leading end.

[53] An apparatus recited in claim 38, further comprising:
said proximal sliding hip pin wherein outer shape of said sliding smooth part generally other than round shape such as "hexagonal or "key" and outer diameter matching with shape and diameter of a proximal holes in intramedullary nail, a barrels, a proximal hole of buttress plate to have continuous uniform sliding contact for said sliding proximal hip pins.

[54] An apparatus recited in claim 38, further comprising:
said proximal hip pin wherein said holding part having plural holes connecting central cannulation of said proximal hip pin to allow injection of liquid cement or other augmentation material to augment the hold of said proximal hip pin in head and neck of femur.

[55] An apparatus recited in claim 37, further comprising:
cannulated variable length end cap having shaft part generally with threads having outer diameter matching inner diameter of said thigh end of intramedullary nail to seal said nail and having head part matching outer diameter of said head end of intramedullary nail and said head part is having variable length to enhance the total length of said nail when required.

[56] A buttress plate for treating fractures of femur bone in combination with an intramedullary nail, said intramedullary nail having longitudinal axis being adapted in use for insertion into medullary canal of femur and having at least one hole directed towards head and neck of femur, said buttress plate comprising :

a plate contoured or contourable to upper part of said femur bone ;and

at least one hole in said plate directed towards head and neck of said femur bone wherein axis of said hole is concentric with at least one said hole in said intramedullary nail for insertion of anchoring means adapted in use to engage said head and neck of femur.

[57] A buttress plate of claim 56, wherein said plate further comprising :

at least one proximal hole with slit wherein axis of said proximal hole arranged concentric with axis of said hole in nail towards head and neck of femur and at least one distal hole where axis of said distal hole arranged passing transversely in relation to said longitudinal axis of nail and longitudinal axis of said medullary canal for anchoring means.

[58] A buttress plate of claim 56, wherein said plate further comprising :

at least one distal hole where axis of said distal hole arranged passing transversely in relation to said longitudinal axis of nail and said longitudinal axis of medullary canal for anchoring means adapted in use to pass through said distal hole of buttress plate, said shaft of femur and said nail to secure said plate to said shaft of femur bone and said nail within the medullary canal of the femur.

[59] A buttress plate of claim 56, wherein said plate further comprising:

at least one hole wherein inner surface of said hole having threads.

[60] A method of treating fractures of a patient's femur that is located between head of femur and medullary canal of femur utilizing said buttress plate in combination with intramedullary nail having longitudinal axis being adapted in use for insertion into said medullary canal of femur, said nail having at least one hole directed towards head and neck of femur, said method comprising the steps of :

a) inserting said nail into medullary canal of patient's femur, wherein said nail having at least one hole directed towards head and neck of femur for holding

suitable anchoring means, inserted there into in angled direction relative to said longitudinal axis of said nail such that when said nail is in position within said medullary canal of femur, said hole and said anchoring means inserted there into are each positioned to intersect the longitudinal axis of said nail and axis of said hole is directed towards head and neck of femur;

b) positioning the said nail so that axis of at least one of the holes in said nail extends across the fracture and into the head of femur;

c) placing the said buttress plate on surface of upper part of femur such a way that axis of at least one hole in said buttress plate arranged concentric with said axis of said hole in nail towards head and neck of femur;

d) inserting at least one anchoring means there into the said hole in said buttress plate, said hole in said nail and engage bone tissue of said head of femur.

[61] A method of claim 60, further comprising:

inserting anchoring means through at least one distal hole in said plate directed transversely in relation to said longitudinal axis of said nail and said longitudinal axis of said medullary canal of femur.

[62] A method of claim 60, further comprising:

inserting anchoring means through at least one distal hole in said plate directed transversely in relation to said longitudinal axis of said nail and said longitudinal axis of said medullary canal of femur such that said anchoring means pass through said distal hole of buttress plate, said shaft of femur and said nail to secure said buttress plate to said shaft of femur bone and said nail within the medullary canal of the femur.

ABSTRACT

An implant assembly for proximal femur fracture comprises of a targeting device and intramedullary nail having plurality of proximal holes directed towards head and neck of femur wherein (the axis of the holes makes an ante version angle of about 5° to 20° with the horizontal plane and at the same time axis of plurality of distal holes making 90° angle to longitudinal axis of said nail that holds the femur wherein said nail has reducing cross section area from thigh end to knee end with grooved knee end with anterior curvature even in short length